

11/19/98



JCS03 U.S. PTO

Practitioner's Docket No. TRW(VSSIM)2499RE

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Date: November 19, 1998Assistant Commissioner for Patents  
Washington, D.C. 20231

JCS11 U.S. PTO

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11/19/98

## REISSUE APPLICATION TRANSMITTAL

Transmitted herewith is the application for reissue of U.S.

☒ Utility Patent ☐ Plant ☐ Design Patent  
 No. 5,577,767 issued on November 26, 1996.

Inventor(s): Hiroshi Nemoto

Title: **HOUSING ASSEMBLY FOR AN AIR BAG AND VEHICLE HORN SWITCH**

Enclosed are the following:

1. Specification, claim(s) and drawing(s) (37 C.F.R. § 1.173)

(a) ☒ 5 page(s) of specification  
☒ 10 page(s) of claims  
☒ 1 page(s) of abstract

NOTE: This must include the entire specification and claims of the patent, with the matter to be omitted by reissue enclosed in square brackets. Any additions made by the reissue must be underlined, so that the old and new specifications and claims may be readily compared. Claims should not be renumbered. The numbering of claims added by reissue should follow the number of the highest numbered patent claim. No new matter shall be introduced into the specification. (37 C.F.R. § 1.173).

## CERTIFICATION UNDER 37 C.F.R. 1.10\*

(Express Mail label number is mandatory.)

(Express Mail certification is optional.)

I hereby certify that this Reissue Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date November 19, 1998 in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EE-854338805US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Anita J. Galo

(type or print name of person mailing paper)

Signature of person mailing paper

**WARNING:** Certificate of mailing (first class) or facsimile transmission of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

**\*WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).  
 "Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

- (b) ☐ \_\_\_\_\_ sheet(s) of drawing (drawings amended)  
☐ Formal  
☐ Informal

NOTE: "Amendments which can be made in a reissue drawing, that is, changes from the drawing of the patent, are restricted." 37 C.F.R. § 1.174(b).

- ☐ No changes in the drawings, upon which the original patent was issued, are to be made. Therefore, in accordance with 37 C.F.R. § 1.174(a), please find attached, in the size required for original drawings:
- ☐ a copy of the printed drawings of the patent.
- ☒ a photo print of the original drawings. (FIGS. 1-8)
- ☒ A letter requesting transfer of the drawings from the original patent file to this reissue application is attached.

2. Declaration and power of attorney

- ☒ 6 pages of declaration and power of attorney

3. Preliminary amendment

(check, if applicable)

- ☐ Attached

4. Offer to surrender the original letters patent in accordance with 37 C.F.R. § 1.178 is attached.

- ☐ Offer to surrender is by the inventor  
☐ along with assent of assignee.
- ☐ Offer to surrender is by the assignee of the entire interest (and the reissue application does not seek to enlarge the claims of the original patent).

5. Letters patent

- ☐ Original letters patent are attached.
- ☐ Declaration that original letters patent lost or inaccessible is attached.
- ☒ A copy of the original printed patent is attached.

NOTE: "The application may be accepted for examination in the absence of the original patent or the declaration but one or the other must be supplied before the case is allowed." 37 C.F.R. § 1.178.

NOTE: "Where the original patent grant is not submitted with the reissue application as filed, patentee should include a copy of the printed original patent. Presence of a copy of the original patent is useful for the calculation of the reissue filing fee and for the verification of other identifying data." M.P.E.P., 6th ed., rev. 2, § 1416.

NOTE: "If a reissue be refused, the original patent will be returned to applicant upon his request." 37 C.F.R. § 1.178.

6. Petition to proceed without assignee's assent

☐ Attached hereto is a "PETITION TO PROCEED WITH REISSUE APPLICATION WITHOUT ASSIGNEE'S ASSENT."

A. ☐ The fee payment is authorized in the attached:

☐ "REISSUE APPLICATION TRANSMITTAL" Form

☐ "COMPLETION OF FILING REQUIREMENTS—REISSUE APPLICATION" Form.

B. ☒ Payment is authorized below.

7. Information Disclosure Statement

☒ Attached

☒ Copies of the IDS citation(s) is/are attached.

8. Priority—35 U.S.C. § 119

☐ Priority of application Serial No. \_\_\_\_\_, filed on \_\_\_\_\_, in \_\_\_\_\_ is claimed under 35 U.S.C. § 119.

☐ The certified copy has been filed in prior application Serial No. \_\_\_\_\_ filed on \_\_\_\_\_.

9. Basic Filing Fee Calculation (37 C.F.R. § 1.16(h), (i) and (j))

| CLAIMS AS FILED                        |    |  |   |      |            |   |
|--|----|--|---|------|------------|---|
| Number Filed                           |    | Number Extra   |   | Rate |            | Basic Fee<br>(37 C.F.R. 1.16(h))<br>\$ 760.00 |
| Total<br>Claims (37 CFR 1.16(j))       | 23 | - 20 (and also in<br>excess of total<br>claims in patent | = | 3    | X \$ 18.00 | \$ 54.00                                      |
| Independent<br>Claims (37 CFR 1.16(i)) | 7  | - 3 (number of<br>independent<br>claims in patent)       | = | 4    | X \$ 78.00 | \$ 312.00                                     |
| Filing fee Calculation                 |    |  |   |      |            | <u>\$1,126.00</u>                             |

NOTE: Multiple dependent claims are treated as ordinary claims for fee purposes. 37 C.F.R. 1.16(j).

10. Small Entity Status (if applicable)

NOTE: A new statement is required for the reissue, even if one has been filed in the original patent. 37 C.F.R. § 1.27(a).

- ☐ A statement that this filing is by a small entity is  
☐ attached.

Filing Fee Calculation (50% of above) \$ \_\_\_\_\_

NOTE: If a statement is filed within 2 months of the date of timely payment of a fee, then the excess fee paid will be refunded on request. 37 C.F.R. § 1.28(a). Effective April 1, 1984.

11. Additional Fee Payments

- ☐ Payment is being made for "PETITION TO PROCEED WITH REISSUE  
APPLICATION WITHOUT ASSIGNEE"  
(37 C.F.R. § 1.17(h)).....\$ 0.00

12. Total Fees Due

|                |                    |
|----------------|--------------------|
| Filing Fee     | \$ <u>1,126.00</u> |
| Petition Fee   | \$ <u>0.00</u>     |
| Total Fees Due | \$ <u>1,126.00</u> |

13. Method Of Payment of Fees

- ☒ Enclosed is a check in the amount of \$1,126.00  
☐ Charge Account No. 20-0090 in the amount of \$ \_\_\_\_\_

A duplicate of this request is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

14. Authorization To Charge Additional Fees

**WARNING:** If no fees are to be paid on filing, the following items should not be completed.

**WARNING:** Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 20-0090.

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

**NOTE:** Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☐ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application).

☐ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a)).

☐ 37 CFR § 1.17 (application processing fees).

**NOTE:** "A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

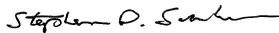
**NOTE:** "Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311 (b))

**NOTE:** Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

**NOTE:** See 37 C.F.R. § 1.28.

15. ☐ **Additional Enclosures**



**SIGNATURE OF PRACTITIONER**

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# HOUSING ASSEMBLY FOR AN AIR BAG AND VEHICLE HORN SWITCH

## BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn.

A known apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn is disclosed in U.S. Pat. No. 5,002,306. U.S. Pat. No. 5,002,306 also discloses two horn switches enclosed by the apparatus. The horn switches are located on opposite sides of a tear seam in an air bag cover. Each horn switch has connectors for connecting the horn switch to a source of electrical energy in the vehicle.

## SUMMARY OF THE INVENTION

The present invention provides a new and improved apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn. The apparatus of the present invention includes an inner cover which at least partially encloses the air bag. The inner cover has a tear seam. An outer cover at least partially encloses the inner cover and the air bag. The outer cover also has a tear seam which overlies the tear seam on the inner cover. A vehicle horn switch is disposed between the inner and outer covers.

The horn switch includes first and second spaced apart tear seams. The first and second tear seams in the horn switch are aligned with the tear seams in the inner and outer covers and have a combined length substantially less than the length of each of the tear seams in the inner and outer covers. When the air bag inflates, the tear seams in the inner cover, in the outer cover and in the horn switch are ruptured by the inflating air bag.

The horn switch includes first and second layers of electrically conductive material. Each layer of electrically conductive material includes two layer portions located on opposite sides of the tear seams in the inner and outer covers. The two layer portions are interconnected by an interconnecting portion which extends across the tear seams in the inner and outer covers. An envelope of electrically insulating material extends around the first and second electrically conductive layers of the horn switch. The envelope also has portions extending around the interconnecting portions. The envelope and interconnecting portions comprise spaced portions of the horn switch and have tear lines along which the envelope and interconnecting portions rupture which define the first and second tear seams in the horn switch.

## BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other features of the present invention will become apparent to one skilled in the art to which the present invention relates upon consideration of the following description of the invention with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic plan view illustrating an apparatus for enclosing an air bag on a vehicle steering wheel;

FIG. 2 is an enlarged, schematic, sectional view, taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a schematic plan view illustrating a first embodiment of a horn switch of the present invention;

FIG. 4 is an enlarged sectional view, taken generally along the line 4—4 of FIG. 3;

FIG. 5 is an enlarged sectional view, taken generally along the line 5—5 of FIG. 3;

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I hereby certify that this paper or fee is being deposited with the U.S. Postal Service, Express Mail Post Office - 10 - Addressee's service under 37 C.F.R. 101.11 on the date indicated below and is addressed to the Commissioner of Patents and Trademarks, Washington, D. C. 20231.

December 19, 1998 Date of Deposit

Antonia Gale  
Signature of Person Mailing Paper or Fee

Antonia S. Gale  
Name of Person Signing

11/19/1998  
Date of Signature

FIG. 6 is a schematic plan view of a layer of electrically conductive material of the horn switch of FIG. 3.

FIG. 7 is a schematic plan view of another layer of electrically conductive material of the horn switch of FIG. 3; and

FIG. 8 is a schematic plan view illustrating a second embodiment of a horn switch of the present invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS EMBODIMENTS OF THE PRESENT INVENTION

In accordance with the present invention, an air bag module 20 (FIGS. 1 and 2) is mounted on a steering wheel 22 of a vehicle. The air bag module 20 includes a housing assembly 24. The housing assembly 24 includes a generally rectangular metal base 28 (FIG. 2) which is connected with the steering wheel by suitable connectors (not shown).

The housing assembly 24 also includes a relatively stiff inner cover 34 connected to the base 28. The inner cover 34 encloses an air bag 38, partially shown in FIG. 2. A resiliently deflectable outer cover 36 encloses the inner cover 34 and the air bag 38. The inner cover 34 has an outer wall 40 and side walls 42 extending from the outer wall 40. The side walls 42 are connected to the base 28. The outer cover 36 has an outer wall 44 covering the outer wall 40 of the inner cover 34 and side walls 46 extending from the outer wall 44. The side walls 46 are connected to the base 28.

The outer cover 36 has weakened areas providing a tear seam 48 preferably having an H-shape (FIG. 1). A central portion 49 of the tear seam 48 extends across the outer wall 44 of the outer cover 36 between legs 51 of the H-shaped tear seam 48. The inner cover 34 also has weakened areas providing a tear seam which is also H-shaped. The tear seam in the inner cover 34 (FIG. 2) lies directly under the tear seam 48 and has a central portion 50 that lies directly under the portion 49 of the tear seam 48. The tear seam central portion 50 has substantially the same length as the tear seam central portion 49.

The air bag 38 (FIG. 2) is connected with the base 28 in any suitable manner. As illustrated, the air bag 38 is connected with base 28 by an annular metal clamp ring 52 and suitable fasteners (not shown). The clamp ring 52 clamps an open end or mouth of the air bag 38 to the base 28. The air bag 38 is clamped around a generally cylindrical air bag inflator 54. The inflator 54 is also secured to the base 28 in a suitable manner. The inflator 54 provides a source of fluid for inflating the air bag 38. The inflator may have many different constructions as is known.

Upon the occurrence of sudden vehicle deceleration requiring air bag inflation, a suitable control apparatus (not shown) activates the inflator 54. The inflator 54, when activated, emits a flow of fluid which inflates the air bag 38. As the air bag 38 inflates, the air bag applies pressure to the inside of the inner cover 34. In response to the pressure, the inner cover 34 ruptures along the tear seam 50, and the outer cover 36 ruptures along the tear seam 48. The pressure applied by the air bag 38 against the inside of the inner cover 34 pivots portions of the inner cover and the outer cover 36 out of the path of inflation of the air bag 38. The air bag 38, when inflated, restrains the vehicle driver from forcefully striking structural parts of the vehicle, such as the steering wheel 22.

A horn switch 58 (FIGS. 2 and 3) is disposed between the inner and outer covers 34 and 36. The horn switch 58 is connected to the inner cover by threaded fasteners 59 (FIG.



2). The horn switch 58 is connected with ground and a source of electrical energy, such as a vehicle battery, through conductors 60 and 62 and a connector 63 (FIG. 3).

The horn switch 58 has an area that is approximately the same as the area of the outer walls 40 and 44 of the inner and outer covers 34 and 36. When the vehicle horn is to be operated, pressure is manually applied against the outer cover 36 to actuate the horn switch 58 and effect operation of the vehicle horn.

The switch 58 has first and second spaced tear seams 64 and 65 (FIG. 3). The switch 58 ruptures along the tear seams 64, 65 upon inflation of the air bag 38. The tear seams 64, 65 may be defined by weakened or perforated areas. The tear seams 64, 65 overlie the central portion 50 of the tear seam in the inner cover 34. Because the central portion 50 is aligned with the central portion 49 of the tear seam 48 in the outer cover 36, the central portion 49 overlies the tear seams 64, 65.

The combined lengths of the first and second tear seams 64 and 65 is substantially less than the lengths of each of the tear seam central portions 49 and 50. The combined lengths of the first and second tear seams 64 and 65 is about one-sixth ( $\frac{1}{6}$ ) the length of each of the tear seam central portions 49 and 50. Since only a small portion of the horn switch 58 ruptures as compared to the inner and outer covers 34 and 36, the horn switch has a minimum retarding effect on inflation of the air bag.

The switch 58 includes a pair of generally flat, flexible, overlying layers 70 and 72 (FIGS. 4-7) of electrically conductive material. Dots or bumps 76 (FIGS. 4 and 5) of polymeric material, which is electrically insulating, are disposed between the layers 70 and 72. The bumps 76 are secured to the layer 70 and engage the layer 72 to separate the two layers until pressure is applied to deflect the layers 70, 72 into engagement with one another. Engagement of the layers 70 and 72 completes an electrical connection to effect operation of the vehicle horn. The layers 70, 72 engage when sufficient pressure is manually applied against the outer cover 36.

The layer 70 (FIGS. 4 and 6) includes layer portions 80 and 82 spaced apart from each other on opposite sides of the tear seam 64 of the horn switch 58. An interconnecting portion 84 of the layer 70 interconnects the portions 80 and 82 and extends across the central portions 50 and 49 of the tear seams in the inner and outer covers 34 and 36. The interconnecting portion 84 includes a tear line 86 (FIG. 6) along which the interconnecting portion ruptures upon air bag inflation. The tear line 86 is aligned with the tear seam central portions 50 and 49 in the inner and outer covers 34 and 36. The tear line 86 of the interconnecting portion 84 may or may not be weakened or perforated since the thickness of the interconnecting portion is small enough that it will easily tear upon inflation of the air bag. The layer portion 82 includes an extension 88 which is connected to the conductor 60.

The portions 80 and 82 of the layer 70 include spaced apart, parallel edge portions 90 and 92, respectively (FIG. 6). Each of the edge portions 90 and 92 extends adjacent and parallel to the central portions 50 and 49 of the tear seams in the inner and outer covers 34 and 36. The interconnecting portion 84 has a dimension measured along the tear line 86 which is substantially less than the length of each of the tear seam portions 49 and 50 and also substantially less than the length of each of the edge portions 90 and 92, as can be clearly seen in FIG. 6. The length of the tear line 86 is less than about one-tenth ( $\frac{1}{10}$ ) the length of each of the tear seam central portions 49 and 50.

The layer 72 (FIGS. 5 and 7) includes layer portions 96 and 98 spaced apart from each other on opposite sides of the tear seam 65 in the horn switch 58. An interconnecting portion 100 of the layer 72 interconnects the portions 96 and 98 and extends across the tear seam central portions 50 and 49 in the inner and outer covers 34 and 36. The interconnecting portion 100 includes a tear line 102 (FIG. 7) along which the interconnecting portion 100 ruptures upon air bag inflation. The tear line 102 is aligned with the tear seam central portions 49 and 50. The tear line 102 of the interconnecting portion 100 may or may not be weakened or perforated since the thickness of the interconnecting portion 100 is small enough that it will easily tear upon inflation of the air bag. The portion 98 includes an extension 104 which is connected to the conductor 62.

The portions 96 and 98 of the layer 72 have spaced apart, parallel edge portions 108 and 110, respectively, that extend adjacent and parallel to the tear seam central portions 50 and 49 in the inner and outer covers 34 and 36. The interconnecting portion 100 has a dimension measured along the tear line 102 which is substantially less than the length of each of the tear seam central portions 49 and 50 and substantially less than the length of each of the edge portions 108 and 110. The length of the tear line 102 is less than about one-tenth ( $\frac{1}{10}$ ) of the length of each of the tear seam central portions 49 and 50. The interconnecting portion 100 (FIG. 3) is spaced apart from the interconnecting portion 84 of the layer 70 along a line 114 (FIG. 3) containing the tear lines 86 and 102.

The two layers 70 and 72 of electrically conductive material are enclosed by an envelope 120 (FIGS. 3-5) of electrically insulating material. The layers 70 and 72 and the envelope 120 are interconnected for installation in and removal from the housing assembly 24 as a unit. The envelope 120 includes a portion 122 enclosing the portions 80 and 96 of the layers 70 and 72. A portion 124 of the envelope 120 encloses portions 82 and 98 of the layers 70 and 72. The portions 122 and 124 are spaced apart from each other and located on opposite sides of the tear seams 64, 65 in the horn switch 58.

A portion 126 of the envelope 120 extends around the interconnecting portion 84 of the layer 70. A portion 128 of the envelope 120 extends around the interconnecting portion 100 of the layer 72 and is spaced apart from the portion 126. The portions 126 and 128 of the envelope 120 have tear lines along which the portions 126 and 128 rupture upon air bag inflation. The tear lines in the portions 126 and 128 are directly aligned with the tear lines 86 and 102 in the interconnecting portions 84 and 100 of the layers 70 and 72. The tear lines in the portions 126 and 128 may or may not be weakened or perforated since the thickness of the portions 126 and 128 is small enough that they will easily tear upon inflation of the air bag. The tear lines 86 and 102 in the interconnecting portions 84 and 100 and the tear lines in the portions 126 and 128 of the envelope 120 define the first and second tear seams 64 and 65 of the horn switch 58.

The envelope 120 is formed by a pair of generally flat layers 134 and 136 (FIGS. 4 and 5) of electrically insulating polymeric material. The layers 134 and 136 of electrically insulating material are disposed in a side-by-side relationship with the layers 70 and 72 of electrically conductive material. The layers 134 and 136 are bonded together along a flat rim portion 138 to form the envelope 120. The flat rim portion 138 extends around the periphery of the layers 70 and 72 of electrically conductive material. The flat rim portion 138 includes openings 140 for receiving the fasteners 59 to connect the horn switch 58 to the inner cover 34.

In the embodiment of the invention illustrated in FIGS. 1-7, the horn switch 58 is connected with a source of electrical energy and ground through conductors 60 and 62 and a connector 63. In the embodiment illustrated in FIG. 8, the horn switch is connected directly to ground. Since the embodiment of the invention illustrated in FIG. 8 is generally similar to the embodiment of the invention in FIGS. 1-7, similar numerals will be utilized to designate similar components, the suffix letter "a" being associated with the numerals of FIG. 8 to avoid confusion.

A horn switch 58a (FIG. 8) has first and second spaced tear seams 64a and 65a along which the horn switch ruptures upon inflation of an air bag. The tear seams 64a and 65a in the horn switch 58a are aligned with tear seam central portions 50 and 49 in the inner and outer covers 34 and 36. The switch 58a includes a pair of generally flat, flexible overlying layers of electrically conductive material, one of which is shown in FIG. 8, that have substantially the same construction as the layers 70 and 72 of FIGS. 1-7. An envelope 120a of electrically insulating material encloses the layers of electrically conductive material. A plurality of openings 140a in the horn switch 58a receive fasteners for connecting the horn switch to the inner cover 34.

The horn switch 58a is connected with a source of electrical energy, such as a vehicle battery, through conductor 160 and a connector 163. The connector 163 may also connect the source of electrical energy with the inflator. The switch 58a is connected with ground through conductor 162. The conductor 162 is enclosed by the envelope of electrically insulating material 120a. An opening 140a extends through the conductor 162 for connecting the horn switch to the inner cover.

An end portion 166 of the conductor 162 is connected to an electrically conductive ring 168. The ring 168 receives a fastener, such as a bolt, for connecting and causing the ring 168 to engage a ground of another circuit or a ground plate.

Alternatively, the end portion 166 of the conductor 162 may have an opening extending therethrough for receiving a fastener to connect the conductor 162 to ground. The end portion 166 has at least one side exposed or not enclosed by the envelope 120a. Preferably, the end portion 166 is made of a highly conductive material, such as copper, and possibly may have a ring made of a highly conductive material attached thereto.

Although each of the layers 70 and 72 has been disclosed as having only one interconnecting portion, it is contemplated that each layer could have two interconnecting portions. The interconnecting portions of one layer would be aligned with the interconnecting portions of the other layer. Therefore, the two layers 70 and 72 would have the same shape.

From the above description of the invention, those skilled in the art will perceive improvements, changes and modifications. Such improvements, changes and modifications within the skill of the art are intended to be covered by the appended claims.

Having described the invention, the following is claimed:

1. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

an inner cover having a first wall at least partially enclosing the air bag and including means for defining a first tear seam which extends across said first wall and along which said inner cover ruptures upon inflation of the air bag to enable deployment of the air bag;

an outer cover having a second wall at least partially enclosing said inner cover and the air bag and including

means for defining a second tear seam which extends across said second wall and along which said outer cover ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch disposed between said inner and outer covers for effecting operation of the horn, said horn switch including first and second overlying layers of electrically conductive material and first and second tear seams in said horn switch along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag, said first and second tear seams in said horn switch being aligned with said first and second tear seams in said inner and outer covers and having a combined length less than the length of each of said first and second tear seams in said inner and outer covers.

2. An apparatus as set forth in claim 1 wherein said horn switch includes first and second portions located on opposite sides of said first and second tear seams in said horn switch and a pair of spaced apart interconnecting portions interconnecting said first and second portions, said interconnecting portions including said first and second tear seams in said horn switch.

3. An apparatus as set forth in claim 1 wherein said horn switch includes first and second layers of electrically conductive material, each of said first and second layers having portions located on opposite sides of said first and second tear seams in said inner and outer covers and electrically conductive portions interconnecting said portions located on opposite sides of said first and second tear seams in said inner and outer covers.

4. An apparatus as set forth in claim 3 wherein said horn switch includes an envelope of electrically insulating material enclosing said first and second layers of said horn switch.

5. An apparatus as set forth in claim 4 wherein said envelope includes surface means for defining a plurality of openings for receiving fasteners to connect said horn switch to one of said inner and outer covers.

6. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:  
an inner cover at least partially enclosing the air bag and including means for defining a first tear seam in said inner cover along which said inner cover ruptures upon inflation of the air bag to enable deployment of the air bag;

an outer cover at least partially enclosing said inner cover and the air bag and including means for defining a second tear seam in said outer cover along which said outer cover ruptures in response to inflation of the air bag to enable deployment of the air bag; and

a horn switch disposed between said inner and outer covers for effecting operation of the horn, said horn switch including first and second overlying layers of electrically conductive material, said first layer including a first portion with a first tear line aligned with said first and second tear seams in said inner and outer covers, said second layer including a second portion spaced apart from said first portion with a second tear line aligned with said first and second tear seams in said inner and outer covers and spaced apart from said first tear line along a line extending along said first and second tear lines, said horn switch being rupturable along said first and second tear lines upon inflation of the air bag.

7. An apparatus as set forth in claim 6 wherein said first and second tear lines have a combined length less than a length of said first tear seam in said inner cover.

9. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising: an inner cover having a first wall at least partially enclosing the air bag, said first wall being movable upon deployment of the air bag;

an outer cover having a second wall at least partially enclosing said inner cover and the air bag and including means for defining a tear seam which extends across said second wall and along which said outer cover

ruptures upon inflation of the air bag to enable deployment of the air bag; and

- a horn switch disposed between said inner and outer covers for effecting operation of the horn, said horn switch including first and second overlying layers of electrically conductive material and an envelope of electrically insulating material enclosing said first and second layers, said horn switch including a tear seam along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag.

**10.** An apparatus as set forth in claim 9 wherein said tear seam in said horn switch is aligned with said tear seam in said outer cover.

\* \* \* \* \*

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11. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch including first and second overlying layers of electrically conductive material and having first and second tear seams along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag, said first and second tear seams in said horn switch being aligned with said tear seam in said cover wall and having a combined length less than the length of said tear seam in said cover wall.

12. An apparatus as set forth in claim 11 wherein said horn switch includes first and second portions located on opposite sides of said first and second tear seams in said horn switch and includes a pair of spaced apart interconnecting portions interconnecting said first and second portions, said interconnecting portions including said first and second tear seams in said horn switch.

13. An apparatus as set forth in claim 11 wherein each of said first and second layers of electrically conductive material has portions located on opposite sides of said tear seam in said cover wall and has portions interconnecting said portions located on opposite sides of said tear seam in said cover wall.

14. An apparatus as set forth in claim 13 wherein said horn switch includes an envelope of electrically insulating material enclosing said first and second layers of electrically conductive material.

15. An apparatus as set forth in claim 14 wherein said envelope includes surfaces defining openings for receiving fasteners to connect said horn switch to said cover wall.

16. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures in response to inflation of the air bag to enable deployment of the air bag; and



a horn switch including first and second overlying layers of electrically conductive material, said first layer including a first portion with a first tear line aligned with said tear seam in said cover wall, said second layer including a second portion which is spaced apart from said first portion and which has a second tear line aligned with said tear seam in said cover wall, said second tear line being spaced apart from said first tear line along a line extending along said first and second tear lines, said horn switch being rupturable along said first and second tear lines upon inflation of the air bag.

17. An apparatus as set forth in claim 16 wherein said first and second tear lines have a combined length less than the length of said tear seam in said cover wall.

18. An apparatus as set forth in claim 16 wherein said horn switch includes an envelope of electrically insulating material extending around said first and second layers of electrically conductive material, said envelope including a first portion extending around said first portion of said first layer and including a

second portion which is spaced from said first portion and which extends around said second portion of said second layer.

19. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch covered by said cover wall and including first and second overlying layers of electrically conductive material and an envelope of electrically insulating material enclosing said first and second layers, said horn switch including a tear seam along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag.

20. An apparatus as set forth in claim 19 wherein said tear seam in said horn switch is aligned with said tear seam in said cover wall.

21. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch including first and second overlying layers of electrically conductive material, said horn switch having first and second major portions located on opposite sides of said tear seam in said cover wall and having a minor portion interconnecting said first and second major portions, said minor portion being configured to rupture under pressure applied by the air bag upon inflation of the air bag.

22. An apparatus as set forth in claim 21 wherein each of said first and second layers of electrically conductive material has major portions located on opposite sides of said tear seam in said cover wall and has a minor portion interconnecting said major portions, said minor portion of said horn switch comprising said minor portions of said layers.

23. An apparatus as set forth in claim 22 wherein  
said minor portion of said horn switch is one of a  
plurality of minor portions of said horn switch which  
are alike and which are spaced apart in a direction  
parallel to said tear seam in said cover wall.

[57]

# ABSTRACT

An apparatus for enclosing an air bag (38) on a steering wheel (22) includes an inner cover (34) at least partially enclosing the air bag (38) and having a tear seam central portion (50) along which the inner cover ruptures upon inflation of the air bag (38). An outer cover (36) at least partially encloses the inner cover (34) and the air bag (38) and includes a tear seam central portion (49) with a length substantially equal to the length of the tear seam central portion (50) in the inner cover (34). A horn switch (58) is disposed between the inner and outer covers (34 and 36) for effecting operation of a horn. The horn switch (58) includes first and second tear seams (64, 65) aligned with the tear seam central portions (50 and 49) in the inner and outer covers (34 and 36). The first and second tear seams (64, 65) in the horn switch (58) have a combined length substantially less than the length of each of the tear seams (49 and 50).

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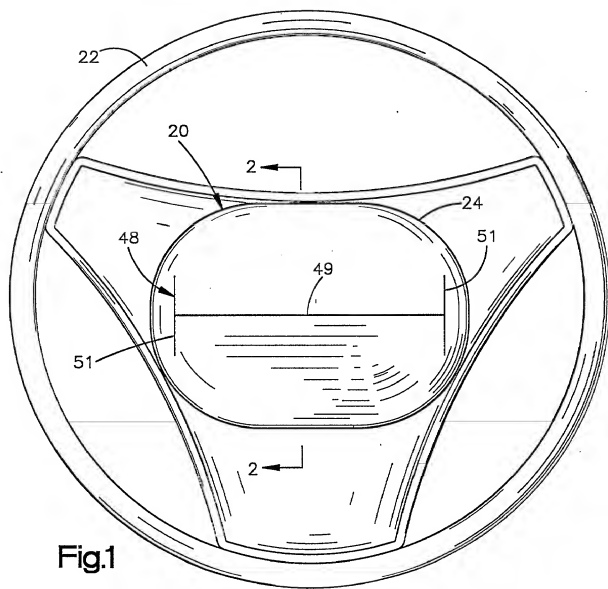


Fig.1

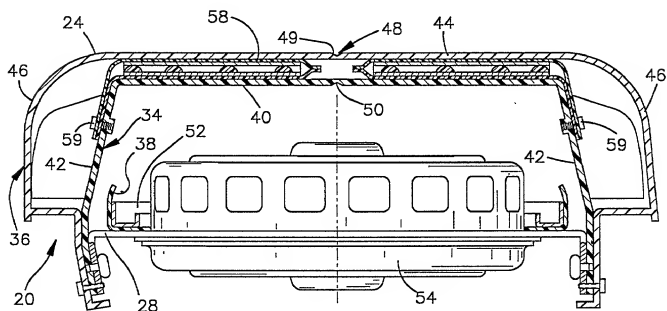
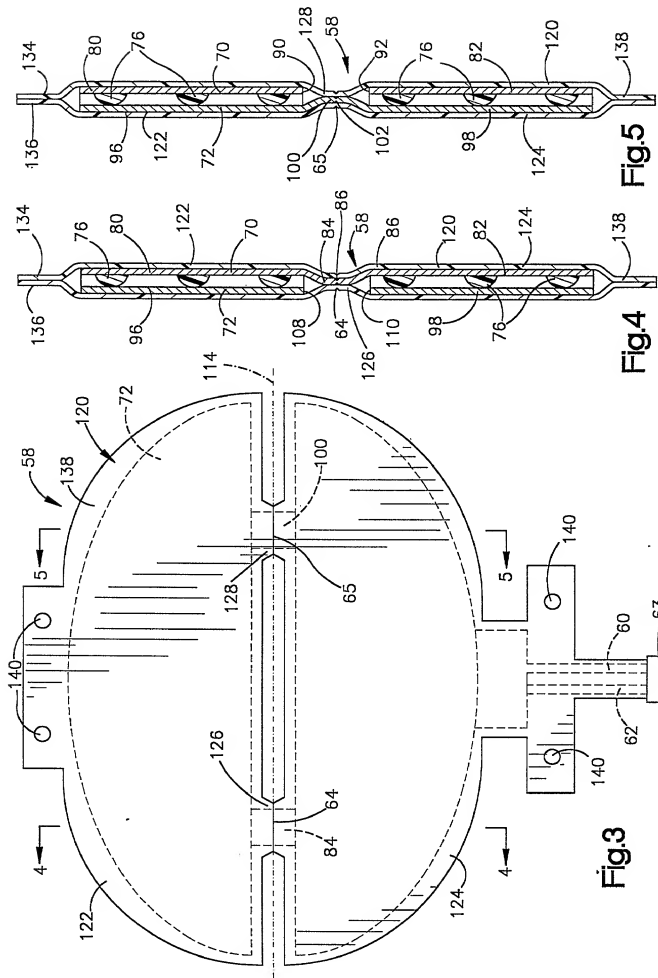
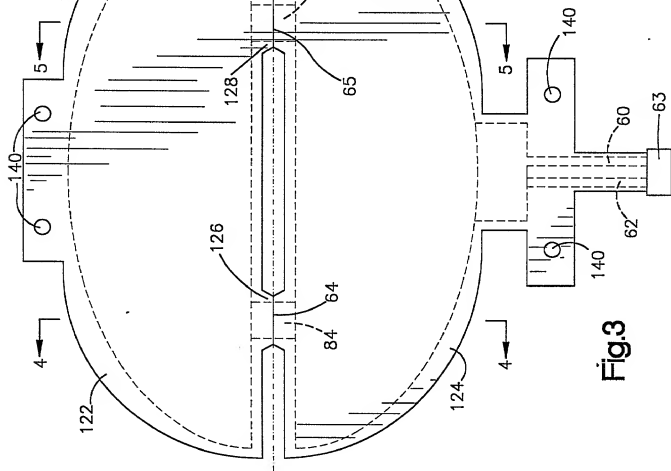


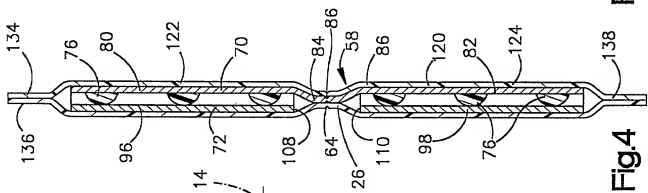
Fig.2



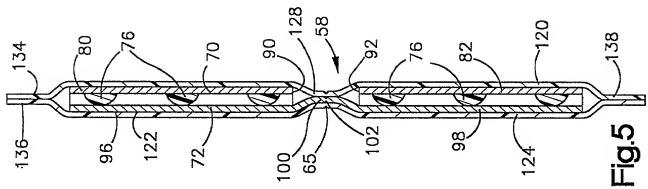
**Fig. 3**

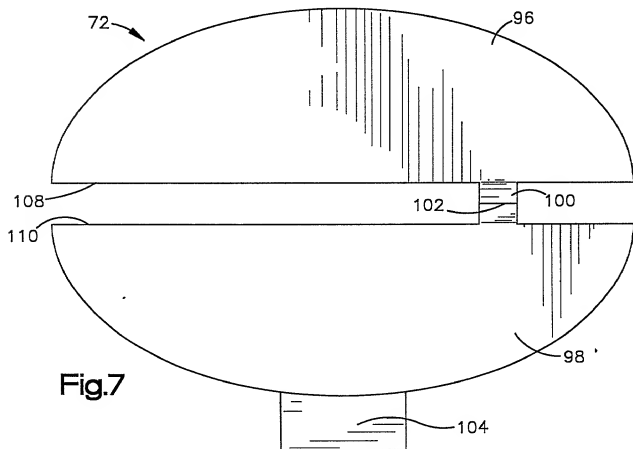
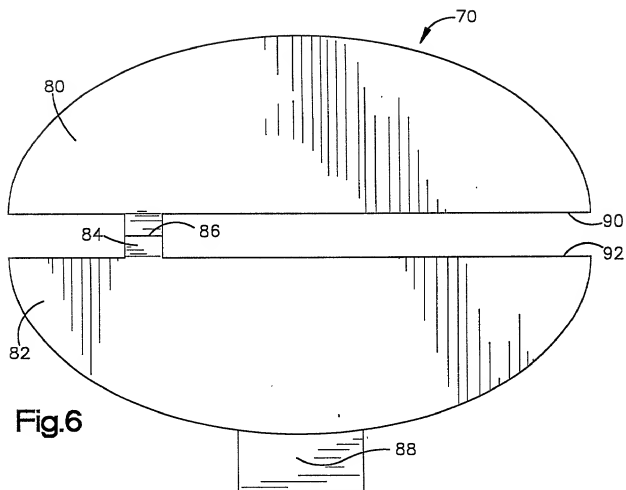


**Fig.4**



**Fig. 5**







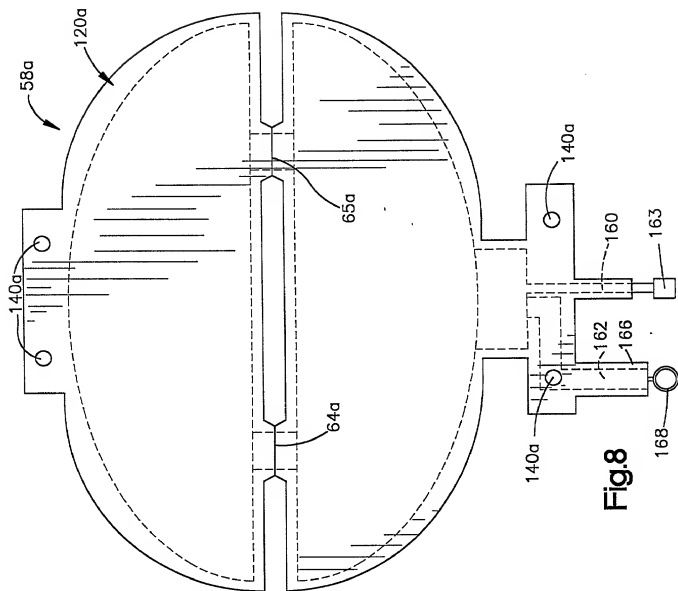


Fig. 8

**REISSUE APPLICATION DECLARATION AND POWER OF ATTORNEY  
(BY INVENTOR(S) OR ASSIGNEE)**

(complete A or B)

**A. ☒ DECLARATION BY THE INVENTOR(S)**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is described and claimed in letters patent number 5,577,767, granted on November 26, 1996, and for which invention I solicit a reissue patent on the invention entitled HOUSING

**ASSEMBLY FOR AN AIR BAG AND VEHICLE HORN SWITCH**

the specification of which

- ☒ is attached hereto.
- ☐ was filed on \_\_\_\_\_, as reissue application number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).
- ☐ I hereby declare that there is no assignee for this application.

NOTE: "Where no assignee exists, applicant should affirmatively state that fact. If the file record is silent as to the existence of an assignee, it will be presumed that no assignee exists." M.P.E.P., 6th ed., rev. 1, § 1410.01.

**B. ☐ DECLARATION BY ASSIGNEE**

NOTE: The assignee of the entire interest may make the declaration, if the reissue application does not seek to enlarge the scope of the claims of the original patent. 37 C.F.R. § 1.172

(type or print name of declarant) \_\_\_\_\_

TITLE \_\_\_\_\_

of \_\_\_\_\_

Name of Company or legal entity on whose behalf declarant is authorized to sign

Declare that I am a citizen of \_\_\_\_\_ and resident of \_\_\_\_\_

\_\_\_\_\_, that the entire title to letter patent number \_\_\_\_\_

for \_\_\_\_\_

granted on \_\_\_\_\_, 19 \_\_\_\_\_ to \_\_\_\_\_  
Inventor(s)

Is vested in \_\_\_\_\_

that I believe said named inventor(s) to be an original, first and sole inventor (if only one name is listed) or an original, first and part inventor (if plural names are listed) of the subject matter that is described and claimed in the aforesaid letters patent and in the foregoing specification and for which invention I solicit a reissue patent.

**ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR**  
(37 C.F.R. § 1.175)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information that is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

- ☒ In compliance with this duty, there is attached an information disclosure statement in accordance with 37 C.F.R. § 1.98.

**PRIORITY CLAIM**

**NOTE:** A "claim" for the benefit of an earlier filing date in a foreign country under 35 U.S.C. § 119(a)—(d) must be made in a reissue application even though such a claim was made in the application on which the original was granted. However, no additional certified copy of the foreign application is necessary. M.P.E.P., 6th ed., rev. 1, § 1417.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

(complete C or D)

- C. ☒ No such applications have been filed.
- D. ☐ Such applications have been filed as follows:

**EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION**

| Country | Application No. | Date of Filing<br>(day, month, year) | Date of Issue<br>(day, month, year) | Priority claimed<br><input type="checkbox"/> YES <input type="checkbox"/> NO |
|---------|-----------------|--------------------------------------|-------------------------------------|--|
|         |                 |                                      |                                     | <input type="checkbox"/> YES <input type="checkbox"/> NO                     |
|         |                 |                                      |                                     | <input type="checkbox"/> YES <input type="checkbox"/> NO                     |
|         |                 |                                      |                                     | <input type="checkbox"/> YES <input type="checkbox"/> NO                     |

**ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION**

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**BENEFIT OF PROVISIONAL APPLICATION**

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**STATEMENT OF INOPERATIVENESS  
OR INVALIDITY OF ORIGINAL PATENT**

(37 C.F.R. § 1.175)

That I verily believe the original patent to be

- ☒ partly  
☐ wholly

inoperative or invalid by reason of (37 C.F.R. § 1.175(a)(1)):

(check all items that may apply)

- ☐ a defective specification  
☐ a defective drawing  
☐ the patentee claiming more or less than the patentee had a right to claim in the patent.

**NOTE:** At least one error must be relied upon as the basis for the reissue. 37 C.F.R. § 1.175(a)(1).

That the error listed above, which are being corrected, up to the time of the filing of this reissue declaration arose without any deceptive intention on the part of the applicant. (37 C.F.R. § 1.175(a)(2).

**NOTE:** For any error corrected not covered by this declaration applicant must submit, before allowance, a supplemental declaration stating that every such error arose without any deceptive intention on the part of the applicant. 37 C.F.R. § 1.175(b)(1).

- ☐ Corroborating affidavits or declarations of others accompany this declaration.

I, **HIROSHI NEMOTO**, hereby declare that I believe U.S. Patent No. 5,577,767 to be partly inoperative by reason of claiming less than I had a right to claim in the patent.

Each claim of the patent is limited by the recitation of an "inner cover." That limitation is not necessary to distinguish my invention patentably from the prior art. The patent thus claims less than I had a right to claim. Accordingly, the "inner cover" limitations in the patent claims are errors being relied upon as the basis for reissue.

All errors being corrected in the present reissue application up to the time of filing of this declaration under 37 C.F.R. § 1.175 arose without deceptive intention on my part.

New claims 11-23 are presented in the present reissue application. New claim 11 is a rewritten version of patent claim 1 and does not recite an inner cover. New claims 12-15 similarly correspond to patent claims 2-5.

New claim 16 is a rewritten version of patent claim 6 and does not recite an inner cover. New claims 17 and 18 similarly correspond to patent claims 7 and 8.

New claim 19 is a rewritten version of patent claim 9 and does not recite an inner cover. New claim 20 similarly corresponds to patent claim 10.

New claims 21-23 are added to define the invention more fully.

It is respectfully submitted that new claims 11-20 correct the errors described above. It is further submitted that each of new claims 11-23 is allowable over the prior art. Allowance of the present reissue application is respectfully requested.

# DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## Signature(s)



### BY THE INVENTOR(S)

Full Name of sole or first inventor Hiroshi Nemoto

Inventor's signature

Date November 18, 1998

Country of Citizenship Japan

Residence Mesa, Arizona

Post Office Address 6632 E. Villeroy Street

Mesa, Arizona 85205

Full Name of second joint inventor, if any

Inventor's signature

Date

Country of Citizenship

Residence

Post Office Address



### BY ASSIGNEE OR PERSON AUTHORIZED TO SIGN ON BEHALF OF ASSIGNEE

NOTE: Even though inventor(s) do not sign, complete above information for inventor(s).

(complete the following, if applicable)

(type name of assignee)

Address of Assignee

Title of person authorized to sign on behalf of assignee



Assignment recorded in PTO on

Reel

Frame



A separate ☐ "ASSIGNMENT (DOCUMENT) COVER SHEET"  
or ☐ FORM PTO 1595 is submitted herewith along with the  
assignment

## POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

Thomas L. Tarolli, Reg. No. 20,177; Robert B. Sundheim, Reg. No. 20,127; Calvin G. Covell, Reg. No. 24,042; Barry L. Tummino, Reg. No. 29,709; Paul E. Szabo, Reg. No. 30,429; Stephen D. Scanlon, Reg. No. 32,755; James L. Tarolli, Reg. No. 36,029; Ronald M. Kachmark, Reg. No. 34,512; Maurice R. Salada, Reg. No. 26,502; Allan W. Voegelé, Reg. No. 28,127 and Gary L. Hermanson, Reg. No. 34,349.

(check the following item, if applicable)

- ☐ I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.
- ☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named practitioner(s) to accept and follow instructions from my representative(s).

Stephen D. Scanlon  
Tarolli, Sundheim, Covell  
Tummino & Szabo L.L.P.  
1111 Leader Building  
526 Superior Avenue  
Cleveland, OH 44114-1400

Stephen D. Scanlon  
at (216) 621-2234

### SEND CORRESPONDENCE TO

**DIRECT TELEPHONE CALLS TO:**  
(Name and telephone number)

☐ Address

☐ Customer Number \_\_\_\_\_

### STATEMENT BY ASSIGNEE

- ☐ Attached is a "STATEMENT UNDER 37 C.F.R. 3.73(b)," establishing the right of the assignee to take action in this reissue.

\_\_\_\_\_  
*Signature of assignee or person authorized to  
Sign on behalf of assignee*

(check proper box(es) for any added page(s) forming a part of this declaration)

- ☐ Signature for third and subsequent joint inventors. Number of pages added. \_\_\_\_\_
- ☐ Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. Number of pages added. \_\_\_\_\_
- ☐ Signature for inventor who refuses to sign or cannot be reached by person authorized under 37 C.F.R. § 1.47. Number of pages added. \_\_\_\_\_
- ☐ Statement of inoperativeness or invalidity of original patent. 37 C.F.R. § 1.175. Number of pages added \_\_\_\_\_
- ☐ Authorization of attorney(s) to accept and follow instructions from representative.
- ☐ Corroborating statements of others.

**REQUEST FOR TRANSFER OF DRAWINGS FROM ORIGINAL PATENT  
TO REISSUE APPLICATION**

Please transfer the drawings from original patent, 5,577,767, filed on  
March 8, 1995, for the invention entitled HOUSING ASSEMBLY FOR AN  
AIR BAG AND VEHICLE HORN SWITCH

to the reissue application, the specification of which:

- ☒ is attached hereto.  
☐ was filed on \_\_\_\_\_, as reissue application number  
\_\_\_\_\_



Signature of Practitioner

Date: 11-19-98

Stephen D. Scanlon  
(type or print name of practitioner)

Reg. No. 32,755

Tarolli Sundheim, Covell,  
Tummino & Szabo L.L.P.  
1111 Leader Building  
526 Superior Avenue  
Cleveland, OH 44114-1400  
P.O. Address

Tel. No. (216) 621-2234

Customer No.: \_\_\_\_\_



#3

Practitioner's Pocket No. TRW(VSSIM)2499RE

PATENT



**ASSENT BY ASSIGNEE FOR FILING OF REISSUE APPLICATION**

NOTE: The written assent of all assignees, if any, owning an undivided interest in the original patent must be included in the application for reissue. 37 C.F.R. 1.172(a).

This is part of the application for a reissue patent filed herewith based on the original patent identified as follows:

TRW Inc.  
Name of Patentee

5,577,767  
Patent Number

November 26, 1996  
Date Patent Issued

HOUSING ASSEMBLY FOR AN AIR BAG AND VEHICLE HORN SWITCH  
Title of Invention

I am assignee owning

- ☒ an undivided interest to the above original patent.  
☐ a                      % (percent) interest in the above original patent.

I assent to the accompanying application for reissue.

Attached is a "Statement under 37 C.F.R. §3.73(b)--Establishing Right of Assignee to Take Action".

TRW Inc.  
Name of Assignee

Signature of person signing for assignee

Date: January 15, 1999

David L. Bialosky, Assistant Secretary, TRW Inc.  
(type or print name and title of person signing for assignee)



**RELATED FORMS**

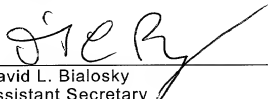
**FORM 17-8**

**ASSENT BY ASSIGNEE FOR FILING OF REISSUE APPLICATION**

**FORM 16-16**

Statement under 37 C.F.R. § 3.73(b)--Establishing Right of Assignee to Take Action

TRW Inc., of 1900 Richmond Road, Lyndhurst, Ohio, is the owner of U.S. Patent No. 5,577,767, as indicated by the Assignment recorded in the U.S. Patent and Trademark Office on March 8, 1995, Reel 7386, Frame 0170-0171.



David L. Bialosky  
Assistant Secretary  
TRW Inc.